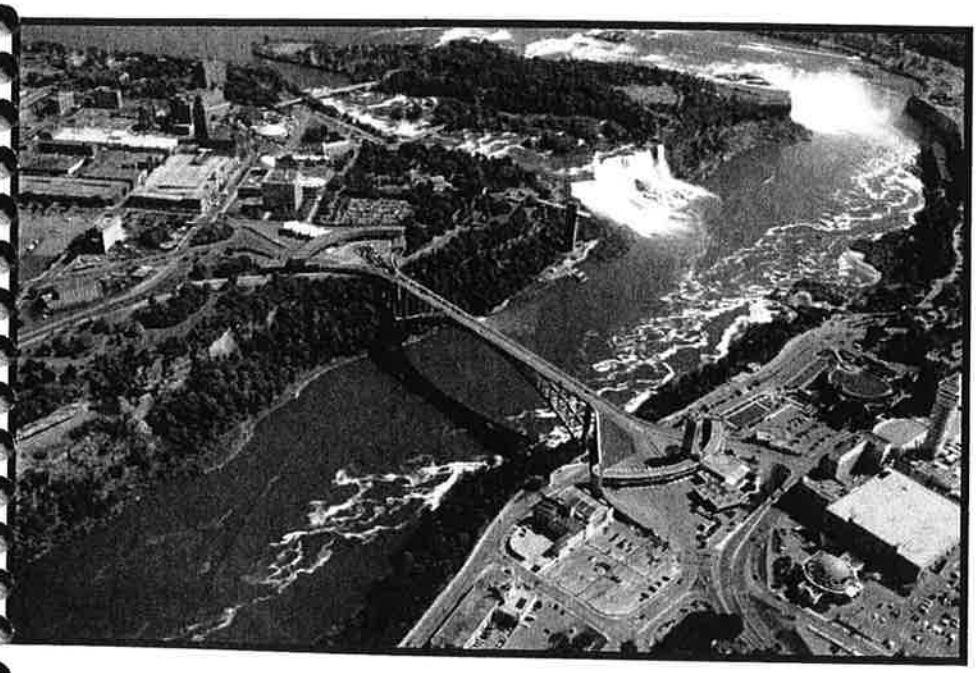
8th INTERNATIONAL CONFERENCE ON SHORT & MEDIUM SPAN BRIDGES

ABSTRACTS



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F. Michael Bartlett

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INTEGRATED STEEL VIADUCTS FOR RAILWAY IN EXTENSION OF A HISTORIC MULTIPLE-ARCH CONCRETE VIADUCT

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ABSTRACT

The existing railway line between Brussels and Ghent crosses the valley of the Pede by a 523 m long historic viaduct. This structure of the 1930's consists of 16 three-hinged reinforced concrete arches of 32 m span, reaching a maximum height of 40 m and supported by hollow concrete piers. The railway company started infrastructure works in increasing the number of tracks of the railway line from 2 to 4 tracks. Widening of the structure by two additional lateral viaducts was only acceptable if these new constructions are respectfully integrated in the historic work of art. The paper describes the final design of new steel viaducts and its supports consisting of steel hollow ribs, which are fading gradually into the existing piers. In advance, the existing foundations were considerably reinforced by additional grouting piles. The design of the superstructure dealing with severe criteria for deformations and accelerations for railway structures consists of a steel box with variable hollow section. The box section is rectangular at the piers and the upper flange is constant along each span. However, the lower flange rises as it reaches the span centre obtaining less section height, while the flange is twisted about a horizontal axis and becomes wider. This created a waving pattern of the steel structure, both in a horizontal plane as in the front view complying with the existing arches. Per track, the total steel viaduct consists of 4 hyperstatic structures having a total length of 130.75 m each, thus being continuous over 4 spans of the historic bridge. On top of the upper flange a concrete deck plate carrying ballast is foreseen. Recently, the construction of the modern structure, showing clearly the contrast with the ancient arches, has been started.